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EXAMINER	
LE, EMILY M	

ART UNIT	PAPER NUMBER
1648	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/666,885	SEGAL ET AL.	
	Examiner	Art Unit	
	Emily Le	1648	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/12/2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *-22, 24-25 and 27-95, 97-98, 100-147* is/are pending in the application.

4a) Of the above claim(s) *28-66 and 101-139* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22,24,25,27,67-95,97,98,100 and 140-147* is/are rejected.

7)☒ Claim(s) *1-22, 24-25, 27, 67-95, 97-98, 100 and 140-147* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 23, 26, 96 and 99 are cancelled. Claims 1-22, 24-25 and 27-95, 97-98, 100-147 are pending. Claims 28-66 and 101-139 are withdrawn from examination because the claims are directed to a non-elected invention. Claims 1-22, 24-25, 27, 67-95, 97-98, 100 and 140-147 are under examination.

2. To allow the entry of the rejection(s) set forth below, this office action is a non-final office action.

Claim Objections

3. Claims 1-22, 24-25, 27, 67-95, 97-98, 100 and 140-147 are objected to because of the following informalities: The limitation "N-acetyl-beta-D-glucosamine" is listed twice. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 4-12, 69-70, 72-74, 77-85, 142, 144 and 146 are rejected under 35 U.S.C. 102(b) as being anticipated by Ramshaw et al.[1]

The claims are directed to an expression vector comprising a nucleic acid molecule encoding a fusion polypeptide comprising i) a first amino acid sequence

[1] Ramshaw et al., U.S. Patent No. 5866131, published February 02, 1999.

selected from the group consisting of a carbohydrate binding domain of a collectin, galectin and a C-type lectin; and an amino acid sequence that can bind to a carbohydrate on a glycoprotein, wherein the carbohydrate is D-mannose, D-glucose, D-fucose, L-fucose, N-acetyl-beta-D-glucosamine or a sialic acid; and ii) a second amino acid sequence comprising the sequence of a ligand for a cell surface polypeptide chosen from the group consisting of a ligand for a cytokine receptor, a CD40, an adhesion molecule, a defesin receptor, a heat shock protein receptor, a counterreceptor for a T cell costimulatory molecule. Claim 4, which depends on claim 1, requires the first amino acid sequence to bind to a sialic acid on a glycoprotein, wherein the sialic acid comprises at least one of the following carbohydrate structures: N-acetylneuraminic acid, alpha-NeuNAc-[2->6]-Gal, alpha-NeuNAc-[2->6]-GalNac and alpha-NeuNAc-[2->3]-Gal. Claim 5, which depends on claim 1, requires the first amino acid sequence to comprise a carbohydrate-binding domain of a naturally occurring lectin. Claim 6, which depends on claim 1, requires the first amino acid sequence to comprise at least 10 contiguous amino acids of a hemagglutinin, which is limited to an influenza virus hemagglutinin by claim 7, which is further limited to the HA1 domain of the influenza virus hemagglutinin by claim 8. Claim 9, which depends on claim 7, limits the influenza virus to influenza A virus, which is further limited to an H1 subtype by claim 11, which is further limited to the A/PR/8/34 strain by claim 12. Claim 10, which depends on claim 9, limits the influenza virus to a subtype that infects humans. Claim 69, which depends on claim 1, requires the fusion polypeptide to further comprise a signal sequence. Claim 70, which depends on claim 1, requires the vector to be a eukaryotic expression vector,

which is limited to a mammalian expression vector by claim 72. Claim 73, which depends on claim 1, requires the vector to comprise a promoter. Claims 74, 77-85, 142, 144 and 146 are directed to an isolated cell comprising the vector of claims 1, 4-12, 69-70 and 72.

Ramshaw et al. teaches an expression vector comprising a nucleic acid molecule encoding a fusion polypeptide comprising i) a first amino acid sequence comprising an amino acid sequence that can bind to a carbohydrate on a glycoprotein, wherein the carbohydrate is D- sialic acid; and ii) a second amino acid sequence comprising the sequence of a ligand for a cell surface polypeptide of a ligand for a cytokine receptor. [Examples 1-12, columns 6-16, in particular.] The first amino acid sequence of Ramshaw et al. is hemagglutinin, a naturally occurring lectin with an amino acid sequence that can bind to a carbohydrate on a glycoprotein, wherein the carbohydrate is sialic acid, including N-acetylneuraminic acid, alpha-NeuNAc-[2->6]-Gal, alpha-NeuNAc-[2->6]-GalNac or alpha-NeuNAc-[2->3]-Gal. The hemagglutinin of Ramshaw et al. comprises at least 10 contiguous amino acids of a an influenza virus hemagglutinin, wherein the virus is influenza A virus, H1 subtype, the A/PR/8/34 strain--a subtype that infects humans. The second amino acid sequence comprises the sequence of a ligand for a cell surface polypeptide of a ligand for a cytokine receptor. The fusion polypeptide of Ramshaw et al. further comprises a signal sequence, and it should be noted that the vector of Ramshaw et al. comprises a promoter. Additionally, Ramshaw et al. teaches the addition of the expression vector to eukaryotic, mammalian cells.

In the instant case, Ramshaw et al. teaches an expression vector that is the same as the claimed expression vector. Hence, Ramshaw et al. anticipates the claimed invention.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 13-14, 67-68, 86-87 and 140-141 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramshaw et al.

Claim 13 limits the influenza virus to subtype H2 or H3. Claim 14 limits the influenza virus to a subtype that does not infect humans. Claim 67, which depends on claim 1, requires the claimed fusion polypeptide to comprise a linker between the first and second amino acid sequences. Claim 68, which depends on claim 67, requires the linker to have the $(Gly_xSer)_n$ formula, wherein n and x is an integer between 1-15 and 1-10, respectively. Claims 86-87 and 140-141 is directed to an isolated host cell comprising the expression vector of claims 13-14 and 67-68.

The significance of Ramshaw et al. is discussed above. In the instant case, while the second amino acid sequence of Ramshaw et al. is an influenza virus hemagglutinin, however, it is noted that it is not of the H2 or H3 subtype and not of a subtype that does not infect humans.

However, at the time the invention was made, it would have been prima facie obvious for one ordinary skill in the art to extend the teachings of Ramshaw et al. to other influenza virus subtype. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to produce a subtype specific composition. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because the other substitution of equivalent alternatives, hemagglutinin of different subtypes, are routinely practiced in the art.

Additionally, it is noted that the fusion polypeptide of Ramshaw does not comprise a linker. However, at the time the invention was made, the use of linkers, including those having the $(Gly_xSer)_n$ formula, to influence the activities of fusion polypeptides is well known. Hence, it would have been prima facie obvious to one of ordinary skill in the art, at the time the invention was made to include a linker between the first and amino acid sequences. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to optimize the activity of the fusion polypeptide. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because optimization is routinely practiced in the art.

Additionally, it would have been prima facie obvious for one of ordinary skill in the art to obtain the coding sequence of the fusion polypeptide rendered obvious by Ramshaw et al., insert it into a vector and transfect cells with the vector. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to express the fusion polypeptide. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because the use of said recombinant techniques are routinely practiced in the art.

8. Claims 1-3, 5, 15-22, 24-25, 27, 67-76, 78, 88-95, 97-98, 100 and 140-147 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hoo.[2]

The claims are directed to an expression vector comprising a nucleic acid molecule encoding a fusion polypeptide comprising i) a first amino acid sequence selected from the group consisting of a carbohydrate binding domain of a collectin, galectin and a C-type lectin; and an amino acid sequence that can bind to a carbohydrate on a glycoprotein, wherein the carbohydrate is D-mannose, D-glucose, D-fucose, L-fucose, N-acetyl-beta-D-glucosamine or a sialic acid; and ii) a second amino acid sequence comprising the sequence of a ligand for a cell surface polypeptide chosen from the group consisting of a ligand for a cytokine receptor, a CD40, an adhesion molecule, a defesin receptor, a heat shock protein receptor, a counterreceptor for a T cell costimulatory molecule. Claims 2-3, which depend on claim 1, require the first amino acid sequence to be N-terminal and C-terminal to the second amino acid sequence, respectively. Claim 5, which depends on claim 1, requires the first amino

[2] Hoo, W., U.S. Patent No. 5891432, published April 06, 1999.

acid sequence to comprise a carbohydrate-binding domain of a naturally occurring lectin. Claim 15, which depends on claim 1, limits the ligand for a cell surface polypeptide to a ligand for a mammalian cell surface polypeptide. Claims 16-17, which depend on claim 15, limit the mammalian cell surface polypeptide to mouse and human cell surface polypeptide, respectively. Claim 18, which depends on claim 1, limits the ligand for a cell surface polypeptide to a ligand for a cell surface polypeptide of a leukocyte, which is further limited to dendritic cells by claim 21. Claim 19, which depends on claim 1, limits the ligand for a cell surface polypeptide be a ligand for a cell surface polypeptide of an antigen presenting cell, which is further limited to a professional antigen presenting cell by claim 20. Claims 22 and 24, which depend on claim 1, limit the ligand for a cell surface polypeptide to a ligand for a mouse GM-CSF receptor and to comprise a mouse GM-CSF receptor, respectively. Claims 25 and 27, which depend on claim 1, limit the ligand for a cell surface polypeptide to a ligand for a human GM-CSF receptor and to comprise a human GM-CSF receptor, respectively. Claim 67, which depends on claim 1, requires the claimed fusion polypeptide to comprise a linker between the first and second amino acid sequences. Claim 68, which depends on claim 67, requires the linker to have the $(Gly_xSer)_n$ formula, wherein n and x is an integer between 1-15 and 1-10, respectively. Claims 69 and 73 require the expression vector to comprise a signal sequence and a promoter. Claims 70-72 require the expression vector to be eukaryotic, yeast and mammalian. Claims 74-76, 78, 88-95, 97-98, 100, 140-142 and 144-147 are directed to an isolated cell comprising the expression vector of claims 1-3, 5, 15-22, 24-25, 27 and 67-72.

Hoo teaches an expression vector comprising a fusion polypeptide comprising a first and second amino acid sequence. [Claim 1, in particular.] The first amino acid sequence in the fusion polypeptide of Hoo comprises the sequence to a heterologous membrane attachment domain. The second amino acid sequence in the fusion polypeptide of Hoo comprises the sequence of a ligand for a cell surface polypeptide that is a ligand for a cytokine receptor. Specifically, the ligand for a cell surface polypeptide present in the fusion polypeptide of Hoo is a ligand for a mouse GM-CSF receptor. [Example I, column 22, in particular.] The ligand for a cell surface polypeptide used by Hoo is a ligand for a mammalian, mouse, cell surface polypeptide; also known as a ligand for a cell surface polypeptide of a leukocyte, wherein the leukocyte is dendritic cells, which is a professional antigen presenting cell. [Columns 1-2, in particular.] Hoo teaches that the first amino acid sequence can be N-terminal and C-terminal to the second amino acid sequence. Hoo also teaches the use of the fusion polypeptide as an adjuvant in vaccine compositions. The expression vector of Hoo also comprises a signal sequence and promoter. Hoo further teaches expression of the vector in prokaryotic and eukaryotic cells, including yeasts and mammalian.

In the instant case, the heterologous membrane attachment domain (the first amino acid sequence) used by Hoo in his working embodiments does not include the amino acid sequence of a carbohydrate binding domain of C-type lectin. However, Hoo does suggest the use of the amino acid sequence of a carbohydrate binding domain of C-type lectin as a heterologous membrane attachment domain. [Table 2, column 8, in

particular.] The specific C-type lectin that Hoo teaches is selectin, a naturally occurring lectin.

Hence, it would have been prima facie obvious for one of ordinary skill in the art, at the time the invention was made, to have use the amino acid sequence of a naturally occurring lectin, selectin as the first amino acid sequence to the fusion polypeptide of Hoo. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to form an adjuvant that enhances the effectiveness of vaccine compositions. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because the fusion polypeptides of Hoo has adjuvant properties.

Additionally, it is noted that claims 16-17, 25 and 27; and 89-90, 98 and 100 require the mammalian cell surface polypeptide to human cell surface polypeptide, and the human cell surface polypeptide be a ligand for a human GM-CSF receptor. While it is noted that fusion polypeptides made by Hoo as part of his working embodiment comprises a ligand for a mouse GM-CSF receptor. However, it would have been prima facie obvious for one of ordinary skill in the art, at the time the invention was made, to use a ligand for a human GM-CSF receptor instead of a ligand for a mouse GM-CSF receptor. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to make an adjuvant that is specific for humans. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because the use of equivalent alternatives is routinely practiced.

In addition, it is noted that the fusion polypeptide of Hoo does not comprise a linker.

However, at the time the invention was made, the use of linkers, including those having the $(Gly_xSer)_n$ formula, to influence the activities of fusion polypeptides is well known. Hence, it would have been prima facie obvious to one of ordinary skill in the art, at the time the invention was made to include a linker between the first and amino acid sequences. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to optimize the activity of the fusion polypeptide. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because optimization is routinely practiced in the art.

Additionally, it would have been prima facie obvious for one of ordinary skill in the art to obtain the coding sequence of the fusion polypeptide rendered obvious by Hoo, insert it into a vector and transfect prokaryotic and eukaryotic cells, including yeast, mammalian and insect cells, with the vector. One of ordinary skill in the art, at the time the invention was made, would have been motivated to do so to express the fusion polypeptide. One of ordinary skill in the art, at the time the invention was made, would have had a reasonable expectation of success for doing so because the use of said recombinant techniques are routinely practiced in the art.

Conclusion

9. No claims are allowed.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emily Le whose telephone number is (571) 272 0903. The examiner can normally be reached on Monday - Friday, 8 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bruce R. Campell can be reached on (571) 272-0974. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Emily M. Le/
Patent Examiner
Art Unit 1648

/E.Le/